

scutes on the carapace of the loggerhead turtle. The material consisted in part of twenty specimens of new-born loggerheads all taken from one nest in New Britain and all showing abnormal numbers of scutes. This was supplemented by fifty-six other specimens from various collections, making in all a total of seventy-six individuals examined. The typical arrangement of the scutes on the loggerhead is as follows: The chief axis of the carapace is covered by six median elements; these are flanked by five pairs of costals; and the edges of the carapace are bounded by thirteen pairs of marginals. In studying the variation of these parts, Gadow has confined his attention to the median and costal elements. The variations in these series took the form of supernumerary scutes. Thus the total number of median elements may rise from six to seven or eight, and of costal elements on a given side from five, to six, seven, or even eight. In the costal scutes the variations were in some instances symmetrical, in others unsymmetrical. It will be observed that all these variations lie above the normal, and, as there is reason for believing that primitive turtles had a greater number of scutes than modern ones, Gadow holds that these variations are to be interpreted as atavistic. According to his belief, the ancestral turtles possessed at least eight median and eight pairs of costal plates. The reduction of these by which the condition in the loggerhead was reached, as indicated by the variations observed, was as follows: Of the original eight median scutes, the seventh was probably the first to disappear, followed by the fifth, thus giving rise to the series of six, typical for the loggerhead; of the original eight pairs of costals, the second pair was probably first lost, then the fifth and, by the fusion of the seventh and eighth, the condition of five pairs characteristic for this species was reached. For variations of this atavistic kind, Gadow, without further comment, proposes the term orthogenetic, a rather summary procedure in our opinion, since this term has already been extensively employed by Eimer for a different phenomenon. More or less looseness, however, pervades the whole paper and appears strikingly in the diagrammatic figures VII. and VIII. (p. 217), which, though

intended to make the subject clear, really lead to confusion from the fact that the system of cross-hatching adopted is incorrectly used. It is to be regretted that a little more care was not exercised in the preparation of what is otherwise an interesting and valuable contribution.

The second paper in this part is by Dr. Willey himself and deals with the South Pacific and West Indian Enteropneusta. To the five species of these worm-like animals previously known from the region in which Dr. Willey collected, three new species are added. Two other new species from the West Indies are also described. The paper contains a synopsis of the families and genera of the Enteropneusta and a full description of the new species. These organisms are of importance because of their supposed relation to vertebrates, and the concluding part of Willey's paper deals with their morphology from this standpoint. A comparison of the central nervous organs, of the supporting axis of the body, of tubules kidney-like in character, and of the gills in the Enteropneusta, the tunicates, and the vertebrates confirm the belief in the natural affinities of these three groups of animals. In the course of this discussion the author suggests the novel idea that the genital glands and gill-slits were primarily unlimited in number and coextensive in distribution, and that the primary function of the gill-slits was the oxygenation of the genital glands, their secondary function being the respiration of the individual.

The concluding paper is by Shipley and deals with the five species of Echinoids collected by Willey. A revision of this group of worms is given together with an account of their geographical distribution.

G. H. PARKER.

Minnesota Plant Life. By CONWAY MACMILLAN. Report of the Survey; Botanical Series, III. St. Paul, Minnesota, October 30, 1899. Octavo, 568 pages.

This is probably the most remarkable State report ever published. The author has given to the world a thoroughly scientific treatise, which is a contribution to our knowledge of the flora of Minnesota, and yet he has done so in such a way that, at the same time, the volume

is one of the most popular of the State reports. This fact alone would mark the book as one of the most notable of recent publications, but when we add the beauty of its typography and illustrations, excellence of paper, and perfection of printing, so generally wanting in State Reports, we are doubly surprised. It is encouraging to find an author, who is an acknowledged master of the vocabulary of technical science, who here shows that he is equally at home in the non-technical presentation of strictly scientific facts in a somewhat new field of botany, and to learn that even State printing may be brought to compete successfully with the finest work done in private establishments. This volume is thus a distinct gain along more than one line.

The purpose of the book cannot be told better than in the author's own words: "In the pages of this book I hope to give the reader an idea of the diversified plant life which occupies the air, the soil and the waters of Minnesota. First of all, it must be remembered that plants, although passive creatures, are quite as truly living beings as are the more active animals. Just as men and women, either themselves or their ancestors, have entered the state from some other region, so also have plants, according to the nature of each, found their way and selected their abodes. It is no easy problem to determine why some family has chosen one village rather than another. This may have been from causes which are too subtle or too remote for analysis, but it is recognized that people have not come to make their homes without some reason which seemed sufficient to them or to their forefathers. So, too, there is always some reason for the appearance at a particular spot of one kind of plant rather than another, and it is possible, in a general way, to explain the vegetation of the hills and meadows of the state" (page 1).

Then follow simple discussions of the geography, climate and physical history of Minnesota, the laws of plant distribution, plant zones, the forests of Minnesota and the world, the North American flora, plant wanderings and migrations, associations between migrating plants, struggles of migrating plants, etc.

In speaking of the number of species of

plants, the author estimates that of the 300,000 now living, about 7500 are probably to be found growing without cultivation in Minnesota, and distributes them approximately as follows: Slime moulds (which later he says are 'more probably animals') 150; bacteria and algæ, 1000; fungi and lichens, 8250; liverworts and mosses, 500; ferns and flowering plants, 2600.

Thirty-seven chapters are given to a general account of the vegetation of the State, under such heads as 'Slime Moulds and Blue-green Algae,' 'The lower sorts of Fungi,' 'Carrion-Fungi and Puff-balls,' 'Lichens and Beetle-fungi,' 'Mosses and Liverworts,' 'Ferns and Water-ferns,' 'Ground-hemlocks and various Pines,' 'Grasses and Sedges,' 'Poplars and Willows,' 'Roses, Peas and their Relatives,' 'Wintergreens to Chaffweeds,' 'Peppermints to Plantains,' 'Dandelions, Ragweeds and Thistles.'

The remaining chapters (XL. to XLV.) are devoted to a general discussion of the ecological problems involved in a full understanding of the flora. One of these takes up 'Adaptations of Plants to their Surroundings,' in which the several factors, Gravity, Mechanical Forces, Heat, Light, Moisture, Electricity and Magnetism, the Soil or Substratum, Other Living Things, and Intra-specific Adaptations are discussed. Another is given to Hydrophytic Plants, another to Xerophytic Plants, and still another to Halophytes and Mesophytes. These chapters, in spite of their titles, are very simply treated, and may be read easily by any person of average ability. The closing chapters are more philosophical and are devoted to the Maintenance of the Plant Individual, and the Maintenance of the Plant Species.

The author has certainly succeeded "in portraying the vegetation of Minnesota as an assemblage of living creatures, as a world of infinite variety, yet with a fundamental unity of plan, as forms linked together in structure, function and adaptation," and he has done so in language so simple, and yet so precise as to afford to us a new suggestion as to the presentation of scientific matter for the public. There is here left no opportunity for the shallow book-writer to take the author's results and

work them over into more popular form, with the inevitable errors, inaccuracies and misrepresentations which characterize such productions. Professor MacMillan has wisely chosen to supply his own popular edition.

CHARLES E. BESSEY.

THE UNIVERSITY OF NEBRASKA.

SCIENTIFIC JOURNALS AND ARTICLES.

The American Naturalist for February has for its first article a paper by Henry Fairfield Osborn on 'The Angulation of the Limbs of Proboscidea, Dinocerata and other Quadrupeds in Adaptation to Weight.' Stephen R. Williams discusses 'The Specific Gravity of some Fresh Water Animals in Relation to their Habits, Development and Composition,' the conclusion being that the movements of an animal are closely related to its density and this in turn to its food habits. Carl H. Eigenmann and George Daniel Shafer describe 'The Mosaic of Single and Twin Cones in the Retina of Fishes,' Thomas H. Montgomery has a 'Note on the Genital Organs of *Zaitha*,' and Maynard M. Metcalf in 'Willey on the Enteropneusta' directs attention to some of that author's far-reaching theoretical conclusions. The 'Synopsis of North American Invertebrates' are again continued, Mary J. Rathbun contributing the seventh part on the Cyclometopous or Cancroid Crabs. The balance of the number is occupied with reviews of recent literature.

In *The Osprey* for February, Paul Bartsch continues his 'Birds of the Road,' and under 'Esthetic Birds' is given Beccari's account of the Gardener Bird of New Guinea. Eugene S. Rolfe presents 'Nesting Notes on the Waders of the Devil's Lake Region,' and W. E. Clyde Todd has an excellent article on 'The Requirements of a Faunal List,' while Philo W. Smith, Jr., describes the 'Nesting of Stephen's Whip-poor-will.' The editor contributes some valuable comments on 'The Origin of the Hawaiian Fauna,' and there are some interesting letters and notes.

THE *Journal of the Boston Society of the Medical Sciences* for January 16th, has for its leading article a paper by Theobald Smith on 'Variation among Pathogenic Bacteria,' a subject to

which Dr. Smith has paid particular attention for many years. As he states, on the one hand the element of variability has been overlooked, and on the other hand the tendency to concede to bacteria any degree of variability, has given rise to theories which leave but little importance to pathogenic bacteria in the ætiology of disease. The writer concludes that since new disease germs are not constantly appearing the inference is that most species cannot adapt themselves to a parasitic existence. Mark W. Richardson has a note 'On the Cultivation of the Typhoid Bacillus from Rose Spots'; E. W. Taylor describes a case of 'Gumma of the Oblongata,' remarkable for the location and size of the tumor, and James H. Wright notes 'A Simple Method for Anaërobic Cultivation in Fluid Media.'

A *Revue des revues d'histoire naturelle* has been established at Paris under the direction of MM. Coupin and de Courdirban. It is published bi-monthly.

DR. A. S. EAKLE, assistant in mineralogy at the University Museum, has become the American editor for Groth's *Zeitschrift für Krystallographie*.

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES.

SECTION OF BIOLOGY.

AT the meeting of February 12, 1900, presided over by Professor Bashford Dean, the following program was offered:

J. A. MacGregor, 'On the Development of the Skull in *Ceratodus*.'

F. B. Sumner, 'Kupfer's Vesicle in Relation to Gastrulation and Concrecence.'

G. S. Huntington, 'Some Muscle Variations of the Pectoral Girdle.'

J. H. MacGregor gave a brief preliminary report on the development of the skull in *Ceratodus*, the Australian lung-fish. The research was made conjointly with Professor Bashford Dean.

Only the early stages of the chondrocranium have as yet been studied; but it is noteworthy that these early stages show even closer resemblance to the amphibian skull than does the adult. The suspensorium is autostylic from the